

SYLLABUS

Meeting Times

Lectures: MWF 1:10-2:00 am

Room: Hugel Science Center 142

Office Hours:

M 11:30 am - 12:30 pm

W 2:30 pm - 3:30 pm

R 10:30 am - 11:30 pm

**office hours will be in Hugel 028*

Contact Information

Professor: Dr. Paul Stonaha

Office: Hugel Science Center 028

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Phone: 610-330-3376

Course Overview:

This course is an introduction to the study of the Sun and its contingent of planets, moons, comets, and asteroids. Up-to-date details of the orbits, surfaces, atmospheres, and interior structures as deduced from telescopic and spacecraft data are discussed. The elementary physics of gravity, orbits, and distance measurement leads to a limited amount of problem solving. Includes weekly laboratory sessions and occasional nighttime observing sessions with telescopes. Requires only high school algebra.

Learning Outcomes:

By the end of this course, you will understand

- the fundamental background of the scientific process, and how to apply the scientific process to observations.
- observed patterns of stars and planets and the corresponding historic interpretations.
- how light and telescopes are used to observe objects within and without the solar system.
- the theory of solar system formation, and the reason for the observed composition of planetary atmospheres and interiors, as well as small solar system bodies.
- properties of our sun, including energy production and observed features.
- theories regarding the formation of life on earth and the potential for life elsewhere in the universe.

Key points in this syllabus:

- Attendance is mandatory
- Completing each weekly homework assignment requires submitting answers on *Smartwork* AND submitting handwritten work online (Moodle).

Prerequisites:

None

Course Text:

21st Century Astronomy, 15th ed. by Palen & Blumenthal with *Smartwork*

You must purchase *Smartwork* to complete homework assignments in this course. Purchasing *Smartwork* will also give you access to the e-textbook. If you want a print version of the textbook for reference, I recommend buying an earlier edition version.

*If you did not purchase with *Smartwork* with the text, you can buy it online at <https://wwnorton.com/books/9780393877021>

Grading:

Grades are determined on the following basis:

| | | | |
|---------------|-----|--------------------|-----|
| Attendance: | 10% | Mid-term Exam I: | 11% |
| Labs: | 20% | Mid-term Exam II: | 11% |
| Problem Sets: | 20% | Mid-term Exam III: | 11% |
| | | Final Exam: | 17% |

Attendance:

Attendance is mandatory. You must arrive to class on time. You will start this course with 6 free 'attendance credits'. Every tardy shall cost you one (1) attendance credit. Every unexcused absence will cost you two (2) attendance credits. If you use up these credits, subsequent tardies and unexcused absences shall add to your attendance demerits (two for absences, one for tardies). Each attendance demerit will cost you 0.25% of your final grade. *If you lose at least 10% of your grade due to this mechanism, it is an automatic course failure.*

(Example: you can have up to 22 absences and 1 tardy and pass this class with up to a 90.25%. But one additional tardy or unexcused absence would cause you to fail the class.)

There will be a sign-in sheet at the beginning of each class meeting to help track attendance; please fill it out upon entering class with the provided pen. Excused absences (accompanied by a Dean's Excuse) will not be penalized.

Laboratory:

The laboratory is an essential part of this course. There you will see and experiment with many of the concepts we cover in class and learn how to approach, analyze, and communicate details of an experiment. You must complete all of the assigned experiments; you will be unable to pass this course unless you both complete all laboratory activities and receive a passing grade for the laboratory part of the course. Further details will be provided by your laboratory instructor.

Problem Sets:

Homework will be assigned on a weekly basis and will generally be due on Wednesdays at noon. Late assignments are generally not accepted, unless you have received an exemption from me ahead of time. Please plan to manage your time accordingly.

Online Homework:

You will submit answers through the Smartwork website. Please log onto Smartwork through Moodle. You will need to purchase access to Smartwork for this class.

Exams

There will be three (3) in-class exams and a comprehensive final exam. Exam format is similar to a homework assignment, but with a few complete-the-sentence style problems.

Academic Honesty:

I expect that you will abide by the "Principles of Intellectual Honesty" appearing in the Lafayette College Student Handbook. Posting homework or exam questions to an external site without my permission is a violation of the Academic Honesty Policy. The Physics department also has an Academic Honesty policy for rules regarding collaboration with others. This document is available on the Moodle page for this class. Please feel free to ask if you have any questions about this policy.

Accommodations:

In accordance with Lafayette College policy, reasonable academic accommodation and support services are available to students who have a documented disability. It is your responsibility to provide me with the appropriate paperwork from the Accessibility Services Office. More information is available at <https://hub.lafayette.edu/>.

Covid-19 Policy:

Masks are not required for healthy, non-exposed individuals in this course section. Lafayette College is following the CDC recommended guidelines for handling cases of exposure to / illness from Covid-19:

For students *exposed to someone who has tested positive* for COVID-19 (close contact):

- If asymptomatic, attend classes.
- Wear a mask for a full 10 days.
- Watch for symptoms. If feeling ill, isolate immediately except to get tested at Bailey Health Center. Students may also use self-supplied, at-home test kits. A minimum of two, preferably three, negative tests taken at least 24 hours apart is recommended.

For students who *test positive* for COVID-19:

- Isolate for a minimum of five days.
- Mask for 10 days.
- A standard Dean's Excuse will be given and the Office of Advising & Co-Curricular Programs will be notified.

Gender Inclusion:

This is a gender-inclusive classroom. I have been provided with a class roster and your legal names. I will gladly honor any requests to be addressed by a different name or pronoun than appears on the class. Please make me aware of any preferences.

Proper Usage of Course Materials & Classroom Recordings:

At Lafayette College, all course materials are proprietary and for class purposes only. This includes posted recordings of lectures, worksheets, discussion prompts, and other course items. Reposting such materials or distributing them through any means is prohibited. Such materials should not be reposted or distributed through any means. You must request my permission prior to creating your own recordings of class materials, and any recordings are not to be shared or posted online even when permission is granted to record. If you have any questions about proper usage of course materials please ask me. Please also be in contact with me if you have any concerns with being recorded during the course.

Common Course of Study Outcomes Statement:

This course (and particularly the lab component) will promote the following outcomes for Natural Sciences (NS) within the Lafayette Common Course of Study:

- NS 1: Employ the fundamental elements of the scientific method in the physical and natural world by identifying and evaluating a testable scientific hypothesis.
- NS2: Create and evaluate descriptions and representations of scientific data via equations, graphs, tables, and/or models.

Moodle Privacy Statement:

Please note that Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws. Courses using Moodle will make student information visible to other students in this class. Please remember that this information is protected by these federal privacy laws and must not be shared with anyone outside the class. Questions can be referred to the Registrar's Office.

Federal Credit Hour Compliance Statement:

Student work in this course is in full compliance with the federal definition of a four-credit hour course. Please see the Registrar's Office website (<https://registrar.lafayette.edu/wp-content/uploads/sites/193/2013/04/Federal-Credit-Hour-Policy-Web-Statement.doc>) for the full policy statement.

Tentative Lecture Schedule and Associated Readings

| Week | Lecture | Date | Topic | Section | Homework |
|------|---------|---------|---------------------------------------|-----------------|-----------|
| 1 | 1 | Aug. 28 | Introduction | | |
| | 2 | Aug. 30 | Our Place in the Solar System | Ch. 1.1 | |
| | 3 | Sep. 1 | Scientific Method | Ch. 1.2-3 | |
| 2 | 4 | Sep. 4 | The Sky: Earth's Rotation | Ch. 2.1 | |
| | 5 | Sep. 6 | The Seasons: Earth's Revolution | Ch. 2.2 | PS 1 due |
| | 6 | Sep. 8 | Moon's Phases | Ch. 2.3 | |
| 3 | 7 | Sep. 11 | Historic Models of the Solar System | Ch. 3.1 | |
| | 8 | Sep. 13 | Kepler's Laws | Ch. 3.2-3 | PS 2 due |
| | 9 | Sep. 15 | Newton's Laws | Ch. 3.4 | |
| 4 | 10 | Sep. 18 | Newton's Law of Gravity | Ch. 4.1 | |
| | 11 | Sep. 20 | Orbits & Orbital Motion | Ch. 4.2 | PS 3 due |
| | | Sep. 22 | EXAM I | Chs. 1-3 | |
| 5 | 12 | Sep. 25 | Tides & Tidal Lock | Ch. 4.3-4 | |
| | 13 | Sep. 27 | Light & Electromagnetic Spectrum | Ch. 5.1 | PS 4 due |
| | 14 | Sep. 29 | Atomic Fingerprints & Doppler Shift | Ch. 5.2-3 | |
| 6 | 15 | Oct. 2 | Equilibrium Temperature & Blackbodies | Ch. 5.4-5 | |
| | 16 | Oct. 4 | Refraction, Reflection, & Telescopes | Ch. 6.1 | PS 5 due |
| | 17 | Oct. 6 | Telescope Limitations & Detectors | Ch. 6.1-2 | |
| 7 | | Oct. 9 | Fall Break | | |
| | 18 | Oct. 11 | Optical Windows & Spacecrafts | Ch. 6.3-4 | PS 6 due |
| | 19 | Oct. 13 | Nebular Hyp. & Protoplanetary Disk | Ch. 7.1-2 | |
| 8 | 20 | Oct. 16 | Solar System Formation - Composition | Ch. 7.3-4 | |
| | 21 | Oct. 18 | Exoplanets | Ch. 7.5, 10.5 | PS 7 due |
| | | Oct. 20 | EXAM II | Chs. 4-6 | |
| 9 | 22 | Oct. 23 | Craters & Radioisotope Dating | Ch. 8.1-2 | |
| | 23 | Oct. 25 | Planetary Interiors I | Ch. 8.3 | PS 8 due |
| | 24 | Oct. 27 | Planetary Interiors II | Ch. 8.4 | |
| 10 | 25 | Oct. 30 | Terrestrial Planetary Atmospheres | Ch. 9.1-2 | |
| | 26 | Nov. 1 | Earth's Atmosphere | Ch. 9.3 | PS 9 due |
| | 27 | Nov. 3 | Greenhouse Effect | Ch. 9.4-5 | |
| 11 | 28 | Nov. 6 | Jovian Planet Atmospheres | Ch. 10.1-2 | |
| | 29 | Nov. 8 | Jovian Planet Interiors | Ch. 10.3 | PS 10 due |
| | 30 | Nov. 10 | Jovian Magnetic Fields | Ch. 10.4 | |

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| 12 | 31 | Nov. 13 | (Jovian) Moons, Active Moons | Ch. 11.1-2 | |
| | 32 | Nov. 15 | Rings | Ch. 11.3-4 | PS 11 due |
| | | Nov. 17 | EXAM III | Chs. 7-10 | |
| 13 | 33 | Nov. 20 | Dwarf Planets & Asteroids | Ch. 12.1-2 | |
| | | Nov. 22 | Thanksgiving Break | | |
| | | Nov. 24 | Thanksgiving Break | | |
| 14 | 34 | Nov. 27 | Comets | Ch. 12.3 | |
| | 35 | Nov. 29 | Meteors & Collisions | Ch. 12.4-5 | PS 12 due |
| | 36 | Dec. 1 | Energy Production in Sun | Ch. 14.1-2 | |
| 15 | 37 | Dec 4 | Solar Atmosphere and Sunspots | Ch. 14.3-4 | |
| | 38 | Dec 6 | Life on Earth | Ch. 24.1-2 | |
| | 39 | Dec 8 | Life Elsewhere | Ch. 24.3-4 | PS 13 due |

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| FINAL EXAM (comprehensive): date and time TBD by the Registrar |
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